THE STATE OF SOUTH CAROLINA'S ADOPTION PLAN FOR NUMERIC NUTRIENT WATER QUALITY CRITERIA

Overview

The South Carolina Department of Health and Environmental Control (SCDHEC or Department) provides this plan in compliance with recent USEPA guidelines regarding the adoption of numeric criteria for nutrients for all waters of the United States. This is a brief description of our current status with development for numeric values for nutrients and includes a schedule for our State's promulgation of water quality criteria for nutrients. This plan describes methods SCDHEC will use to set and adopt water quality standards for nutrient parameters that protect against measurable impacts to the aquatic environment caused by nutrient over-enrichment.

The standards development process should lead to adoption of water quality standards for nutrients for all waters by 2008. The date of adoption is subject to change depending on the outcome of the earlier tasks. SCDHEC staff will review this plan, at least annually, the USEPA will be notified, and the two parties will reestablish mutual agreement on any changes.

Prioritization, Classification, and Coverage of Waters

The Department has begun the process of promulgating numeric nutrient criteria for its waters with the adoption of numeric nutrient criteria for lakes of forty acres or more in the 2001 triennial review of the water quality standards regulation, South Carolina Regulation 61-68 *Water Classifications and Standards* (R.61-68). Due to both necessity and a legal urgency, the Department prioritized its lakes for numeric nutrient criteria development. We adopted an ecoregional approach for classification of these waters and modified EPA's Approach to Criteria Development as outlined in the Technical Guidance Documents that are specific to the waterbody types to reflect attributes specific to South Carolina's lakes.

We are currently gathering additional data and information on our State's estuaries, as well as reviewing data and information on our rivers and streams. It is our intent to have all of our State's waters covered by numeric criteria and to ensure that they reflect a scientifically-defensible and sound approach that will not only provide for the protection and maintenance of our waters from nutrient over-enrichment, but will also improve those waters that are currently impaired due to nutrient loadings. South Carolina's waters have classified uses that support all of the fishable/swimmable goals of the Clean Water Act.

Parameters to be Evaluated

South Carolina has adopted all four of the USEPA nutrient criteria parameters for use with lakes, but will determine through the development process if all four are necessary for each additional type of waters.

a. Total Phosphorus - Phosphorus has largely been implicated as the cause of over-enrichment in freshwater systems and implicated recently as the limiting factor in marine systems as well, thus it is likely that we will develop and adopt phosphorus criteria for all classes of waters. Criteria will be set based on evaluations of relationships between total phosphorus (TP) and various response variables [e.g., chlorophyll *a*, dissolved oxygen (DO), and biological indices].

b. Total Nitrogen - The extent or value of developing nitrogen criteria for all South Carolina waters will be examined further. We will determine whether nitrogen criteria are needed for all waters by evaluating

relationships between nitrogen concentrations and in-stream biological parameters (e.g., chlorophyll *a*, and biological indices). The need for nitrogen loading controls to address down stream water quality impacts will also be evaluated.

c. Chlorophyll *a* (can include periphyton and phytoplankton)- We will evaluate the utility of chlorophyll *a* criteria by examining relationships between chlorophyll *a* and nutrients in lotic and lentic waters.

d. Turbidity - South Carolina has adopted turbidity criteria for all of its waters based on waterbody types and also their classified uses.

e. Other information to be evaluated - The Department will evaluate biological indices and macroinvertebrate data to determine its utility for setting nutrient criteria. The Department is also considering the use of dissolved oxygen data and information as it relates to productivity or algal biomass.

Criteria Development Process

Protection of Classified Uses

South Carolina's nutrient standards will continue to be based on use protection using State-specific data and not just simply a statistical evaluation of the national dataset. We will translate our narrative water quality standards in association with any applicable numeric nutrient criteria adopted as an assurance of coverage for all of the waters of the State and, if necessary, the Department will include a mechanism reference in the water quality standards. Where necessary, the Department will develop numeric nutrient criteria to protect specified uses of the waters of the State.

Approach for Existing Nutrient Criteria

Initially, South Carolina had generated a significant amount of data and information on our lakes of 40 acres or more through our Section 314 program and continue to monitor the trophic status of these waters. We decided to better reflect conditions found in our lakes and reservoirs, we would use our data and information to develop our existing numeric criteria. Once the review of the data and information was completed, we made a comparison to our trophic indicators previously used by the Department for assessment of trophic conditions and developed nutrient criteria that fully reflected localized conditions, following a modification of the process described in EPA's guidance document for lakes. The Department has determined that lakes that exceed these values have eutrophic tendencies and have selected these values to be protective of the beneficial uses of the lakes in South Carolina.

Approach for Developing Remaining Nutrient Criteria and Data Sources and Analysis

South Carolina plans to utilize EPA's technical guidance or modifications thereof to refine and develop criteria for other waters of the State. The actual approaches used will most likely depend on the result of the analysis of available data and future data collections and will use only data specific to South Carolina waters. The approaches will include either effect-based (correlating nutrient levels with measurable water quality or biological effects or impairments utilizing available data and data to be collected, findings in published literature, and historical information) or reference-based (utilizing a percentile of the frequency distribution of all sites for different water body types based on site-specific data and ecoregions).

- Estuaries –

  All of South Carolina's estuaries lie within Nutrient Ecoregion XIV. During criteria

development, we will determine if it is appropriate to have one set of indicators for all estuarine waters or to include several sets. Recently, SCDHEC has expanded its analysis of estuarine eutrophication indicators, as well as spatial coverage for estuarine sampling. Approximately 24,000 observations have been collected from 1990 to date; however, additional sampling, especially for chlorophyll *a*, is needed to ensure sufficient data for appropriate classification of estuaries. Nitrogen, phosphorus, chlorophyll *a*, and turbidity data will be collected from tidal creeks and open waters using both fixed and random sampling designs. The Department included in its original grant request that we may have data and information from additional resources such as the South Carolina Department of Natural Resources and the University of South Carolina as they may become available. The Department intends that numeric nutrient criteria for estuaries be adopted in the next triennial review of the water quality standards and should be completed by mid 2007. The Department will provide progress reports to the USEPA and will submit for early review and concurrence any numeric criteria (including supporting data and analyses) proposed for water quality standards adoption.

- Rivers and Streams –

  South Carolina's rivers and streams lie within Nutrient Ecoregions IX, XI, and XIV. SCDHEC's river and stream monitoring program has traditionally included phosphorus, nitrogen, turbidity and biological community analyses, with excellent spatial coverage across ecoregions and stream classes. Over 120,000 observations have been collected from 1990 to date. All appropriate data and information will be analyzed and used to develop numeric nutrient criteria for South Carolina rivers and streams according to EPA guidance. The relationships between nutrients and designated uses of these waterbodies will be evaluated. The Department intends that numeric nutrient criteria for rivers and streams be adopted in the next triennial review of the water quality standards and should be completed by mid 2007. The Department will provide progress reports to the USEPA and will submit for early review and concurrence any numeric criteria (including supporting data and analyses) proposed for water quality standards adoption.

Sources of Data

Most data are from state sources retrieved from STORET while some state data may be used that is not in the National Nutrient Database. Other data will be reviewed as provided by external sources (USGS, studies, etc) and also from continued data collection by the Department and/or other state or federal agencies.

Data collection will be conducted by Department staff according to SCDHEC Standard Operating Procedures. Statistical analyses will be performed by staff using Excel, SAS or other appropriate software.

Department staff have gathered information from various sources regarding historical and current studies of nutrients in South Carolina estuaries, rivers and streams. This information may be used for background or baseline determinations.

Algal growth potential tests (AGPTs) have been conducted on selected sites from South Carolina estuaries. Department staff also collected physicochemical data (DO, pH, salinity, secchi depth, etc.), nutrient samples (total ammonia, total nitrate/nitrite, TKN, and total phosphorus) and chlorophyll *a* samples concurrently at these sites.

Department staff have consulted on results of AGPT study and data analysis of nutrient relationships (e. g. causal versus response indicators) in estuaries. This study was conducted in 2003 with a preliminary report due in May 2004.

Additional data needs

Although several continuing and new sampling initiatives are mentioned above, not all represent extensive data collection for the expressed purpose of developing nutrient criteria. Currently, resources to collect these types of information are not available from state funds. South Carolina will seek to utilize any additional available funds, EPA nutrient criteria development and/or training funds, information available from studies in other states, etc. to provide resources or information to help fill in these data gaps. Additional data and resource needs include, but are not limited to:

a. Further assessments of relationships between nutrient (TP and TN) concentrations and impairment of designated uses in more waters throughout the state.
b. Seasonal effects of nutrients.
c. The importance of flow, turbidity, substrate, and light in moderating the effects of nutrients.
d. Additional resources to collect, compile, and analyze data from future collection efforts.

Other Concerns to be Addressed

The Department has other issues that we believe will need to be addressed as we develop criteria for other waters of the State regarding nutrient criteria implementation. We expect to address these issues throughout the development process as we gather additional information and review that data and information. These issues include, but are not limited to, the following:

- Criteria protective of designated uses
- Continued application of narrative criteria
- System for evaluating exceedences of nutrient criteria for assessment
- Modeling and assessing effluents
- Consideration of downstream effects

Schedule

The Department intends that numeric nutrient criteria for estuaries and rivers and streams be adopted in the next triennial review of the water quality standards and should be completed by mid 2007.

Adoption Process

The Department must promulgate these criteria through its regulation process as new water quality standards. Our state process is a lengthy one and provides for ample opportunity for public involvement and participation. The first step by the Department is to develop the criteria based upon the process we have described. The next step is to begin the public process of adoption of these values. This process will require multiple public comment periods and opportunities for the public to provide additional data, information, and comment to the actual development of the water quality standards that are derived from

the criteria development process. This often includes application and implementation decisions as well as the criteria themselves. Our process for regulation development is briefly described as follows:

- Notice of Drafting – *State Register* notification. Includes a thirty (30) day comment period.
- Meetings with stakeholders – Usually multiple meetings are convened to provide for interaction between the many different stakeholders and the Department. Other Federal and State agencies are involved as well as environmental groups and members of the regulated community along with local governmental groups representing cities and towns.
- First Board meeting – The Department requests permission from our Agency Board members for a Notice of Proposed Regulation, a Staff-conducted Informational Forum to be convened, and a Public Hearing to be held.
- Notice of Proposed Regulation – *State Register* notification. Another thirty (30) day comment period. Department prepares final language of the regulation and a responsiveness summary to all comments received during the process.
- Staff Informational Forum – The Department provides an additional opportunity for the public to provide comments regarding the proposed regulation.
- Public Hearing – Conducted before the DHEC Board and if the proposed regulation is approved, then the Department may go forward with sending the promulgated regulation to the South Carolina Legislature for approval.
- Submittal to S.C. Legislature – If after 120 days, it is approved or no action taken, the regulation may be placed in the *State Register*.
- *State Register* notification – The regulation becomes effective for purposes of state activities.
- Submittal by the AG to the EPA – EPA is now given sixty (60) days to approve the regulation revision or ninety (90) days to disapprove.
- If approved by the EPA – State may use the numeric criteria as South Carolina water quality standards for purposes of the Clean Water Act.

Summary

South Carolina was the first state in Region 4 to promulgate and adopt numeric nutrient criteria for lakes based upon a modification of the current EPA guidelines. We continue to develop numeric criteria and believe that these criteria are essential for our water quality standards program and for our water programs in general. We are committed to their continued development. We have used two previous EPA nutrient grants to purchase equipment and have staff collect and review data for river and streams and estuary numeric nutrient criteria.